

## REMARKS

### Claim Rejections - 35 U.S.C. § 103

The Examiner has rejected claims 1-5, 7-9, 12-14, and 26-29 under 35 USC 103(a) as being unpatentable over Farkas et al. (U.S. Patent No. 5,773,364), Farkas (Oxidation and Etching of Tungsten in CMP Slurries), Grumbine et al. (U.S. Patent No. 6,083,419) and Brusic et al. (Electrochemical Approach to Au and Cu CMP Process Development). The Applicant respectfully traverses. It would not be obvious to combine Farkas '364 or Brusic with the Farkas article, or with Grumbine. This is because Farkas '364 and Brusic are directed towards the polishing of copper and the Farkas article and Grumbine are directed towards the polishing of tungsten. This is significant because copper oxidizes in a very different manner than tungsten and the polishing of copper by chemical mechanical polishing (CMP) will therefore be very different than the polishing of tungsten by CMP.

Tungsten and copper are both metals, but that does not mean that they oxidize in the same manner. Tungsten metal layers form a thin oxide film on the top of the metal layer when oxidized. This oxide film will passivate the remainder of the metal layer, preventing the oxidation of the deeper laying metal layer. In contrast, the oxidation of copper will not stop at the surface of a copper layer. Copper will continue to oxidize until an oxidizing agent to which the copper is exposed is removed or a passivating agent is added. Both the Farkas article and Brusic describe these different oxidation mechanisms. The Farkas article on page 26, in the 5<sup>th</sup> full paragraph, states that "[f]requently, the metal [tungsten] surface will become quickly passivated with a protective oxide layer in the solution." Brusic, on page

179, in the second full paragraph, states that "[I]n solutions with pH 7 and lower, a copper surface does not spontaneously passivate."

Therefore, it would not be obvious to combine Farkas '364 or Brusic, that both teach the CMP of copper, with the Farkas article or with Grumbine, that both teach the CMP of tungsten. This is because the oxidation mechanisms on which chemical mechanical polishing is based are dramatically different on a copper substrate than on a tungsten substrate. Thus, the Applicant's claims are not obvious in light of the combination of the above cited references.

#### **Claim Objections**

The Examiner has rejected claims 8 and 9 under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Claims 8 and 9 have been cancelled.

**Petition for Extension of Time Pursuant to 37 C.F.R. 1.136(a)**

Applicant respectfully petitions pursuant to 37 CFR 1.136(a) for a one-month extension of time to file this response to the Office Action mailed February 21, 2003. The extended period is set to expire on June 21, 2003. A check in the amount of \$110.00 is enclosed to cover the fee for a one-month extension of time.


Pursuant to 37 CFR 1.136(a)(3), applicant(s) hereby request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 CFR 1.16 and 1.17, to Deposit Account No. 02-2666.

If there are any additional charges, please charge Deposit Account No. 02-2666.

Respectfully submitted,

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